Claims

We claim:

1   1. A method for processing RF signals in a multi-antenna systems,

2   comprising:

3   generating L_t input data streams in a transmitter;

4   modulating the L_t weighted input data streams to RF signals;

5   switching the RF signals to $t \geq L_t$ RF branches;

6   applying a phase-shift transformation to the RF signals by a $t \times t$

7   matrix multiplication operator Φ_1, whose output are t RF signals;

8   transmitting the t RF signals over a channel by t transmit antennas;

9   receiving the transmitted signals by r antennas in a receiver;

10   applying a phase-shift transformation to the r RF signals by a $r \times r$

11 matrix multiplication operator Φ_2;

12   selecting L_r branches from the r streams;

13   demodulated the L_r signal streams; and

14   processing in baseband to recover output data streams corresponding

15 to the input data streams.

1   2. The method of claim 1, in which each of the L_t input data stream has a

2   weight, and further comprising:

3   summing the L_r weighted data streams before the demodulating and

4   decoding.

1 3. The method of claim 1, in which the L_t input data streams are generated

2 by a space-time block coder.

1 4. The method of claim 1, in which the L_t input data streams are generated

2 by a space-time trellis coder.

1 5. The method of claim 1, in which the input data streams are space-time

2 layered structures.

1 6. The method of claim 1, in which $t = L_t$, and the matrix Φ_1 is an identity

2 matrix.

1 7. The method of claim 1, in which $r = L_r$, and the matrix Φ_2 is an identity

2 matrix.

1 8. The method of claim 1, in which entries of the matrix Φ_1 have constant

2 modulus phase-only terms.

1 9. The method of claim 1, in which entries of the matrix Φ_2 have constant

2 modulus phase-only terms.

1 10. The method of claim 1, in which entries of the matrices Φ_1 and Φ_2 have

2 constant modulus phase-only terms.

1 11. The method of claims 8, in which the phase-only terms adapt to an

2 estimate of an instantaneous channel state.

1   12. The method of claim 8, in which the phase-only terms adapt to an

2   estimate of an average channel state.

1   13. The method of claim 1, in which the matrix Φ_1 is a fast Fourier

2   transform matrix.

1   14. The method of claim 1, in which the matrix Φ_2 is a fast Fourier

2   transform matrix.

1   15. The method of claim 1, in which the matrices Φ_1 and Φ_2 are fast Fourier

2   transform matrices.